

REMARKS/ARGUMENTS

Claims 1, 2, 5-11, 13-21, 23 and 24 are pending in the present application. Claims 1, 2, 5-11, 13-21, 23 and 24 have been rejected. No claims were merely objected to and no claims were allowed. By entry of this amendment, no claims are cancelled, no claims are amended and no new claims are added. Support for the amendment to the specification may at least be found at page 5, lines 14-22 of Applicants' specification and at least at col. 7, l. 67-col. 8, l. 1 of U.S.P.N. 5,449,536 to Funkhouser et al., incorporated by reference therein. No new matter is presented.

Rejections under 35 U.S.C. §103(a)

The Examiner rejected claims 1, 5-10, 13-20 and 23-24 under 35 U.S.C. §103(a) as being unpatentable over U.S.P.N. 6,495,793 to Tewari ("Tewari") in view of U.S.P.N. 6,387,541 to Gray et al. ("Gray") and U.S.P.N. 5,449,536 to Funkhouser ("Funkhouser") or U.S.P.N. 5,043,548 to Whitney et al. ("Whitney").

Applicants' claims 5-9, 13-18, 20 and 23-24 ultimately depend upon independent claims 1, 10 and 19.

Tewari teaches a method for weld repairing, without preheating, a gas turbine engine blade airfoil (col. 2, ll. 54-56). The laser beam, operating in a power range of about 50-10000 watts per centimeter, is focused away from the substrate surface to provide a laser spot in the size range of about 0.03-0.2 inches (Abstract; col. 4, ll. 35-43). The laser repair conducts the repair at ambient temperature without preheating the substrate surface and by controlling processing parameters to avoid cracking of the resulting weld bead during and after welding (Abstract; col. 4, ll. 15-25). Controlling the heat input at the surface of the weld repair is provided through selection of a combination of laser power, laser beam focus away from the substrate surface to provide a selected spot size range, power feed rate and relative movement between the substrate surface and the laser spot (col. 2, ll. 33-38 and col. 4, ll. 18-25). In an example, Tewari teaches the laser beam was focused away from the surface portion of the airfoil tip to provide on the radially outer surface a laser spot in the range of about 0.03-0.20 inches in diameter to

reduce the overall power density (power per unit area) (col. 5, ll. 8-16). During such relative movement under these conditions, the repair powder was deposited substantially concentrically in the laser beam above the laser spot (col. 5, ll. 16-20).

Applicants' independent claims 1, 10 and 19 recite in part the following, "positioning a laser apparatus over the airfoil such that a focal point of said laser is about 0.10 inches to about 1 inch above the affected section and said laser forms a defocused hot zone at a distance above the affected section sufficient to prevent the airfoil from melting;". Tewari does not teach or suggest placing the focal point of the laser at "about 0.10 inches to about 1 inch above the affected section" or airfoil tip as taught therein. In addition, Gray does not teach or suggest placing the focal point of a laser at "about 0.10 inches to about 1 inch above the affected section" when applying the coating(s) taught therein. The combination of teachings of Tewari in view of Gray do not teach, suggest or provide the requisite motivation to one of ordinary skill in the art to modify their teachings and place the focal point of the laser at "about 0.10 inches to about 1 inch above the affected section" as recited in Applicants' amended independent claims 1, 10 and 19.

The placement of the focal point of the laser at said distance would not have been obvious to try given the combined teachings of Tewari and Gray. Tewari teaches and suggests controlling the heat input at the surface of the weld repair using a combination of laser power, laser beam focus away from the substrate surface to provide a selected spot size range, power feed rate and relative movement between the substrate surface and the laser spot. Tewari neither teaches nor suggests the placement of the focal point of the laser at said distance, or any particular or significant distance for that matter, as a way to control the heat input at the surface of the weld repair. Gray is silent with respect to such operating parameters. One of ordinary skill in the art could try varying all of these parameters enumerated by Tewari or try each of numerous possible choices until one possibly arrived at a successful result. However, Tewari provides no clear teaching or suggestion to place the focal point of the laser at said distance or suggest any criticality

associated with placing the focal point of the laser at said distance or whether the placement of the laser at said distance would likely be successful in practicing the method of Tewari. In turn, the combination of Tewari in view of Gray does not teach, suggest or provide the requisite motivation necessary to modify their combined teachings and achieve all of the claim elements of Applicants' independent claims 1, 10 and 10.

The examiner relies upon Funkhouser or Whitney to cure the deficiencies present in the combined teachings of Tewari in view of Gray. Applicants respectfully disagree with the examiner's interpretation and application of the teachings of both Funkhouser and Whitney. Applicants contend the examiner is cherry picking select teachings from both references and applying such teachings in a vacuum without duly considering the teachings as a whole of either reference. Funkhouser teaches the placement of the focal point of the laser at a particular distance, which directly contravenes the teachings of Tewari. Tewari specifically teaches and suggests controlling the heat input at the surface of the weld repair using a combination of laser power, laser beam focus away from the substrate surface to provide a selected spot size range, power feed rate and relative movement between the substrate surface and the laser spot. Funkhouser directly contravenes Tewari and clearly teaches away from Tewari. One of ordinary skill in the art would not be motivated to alter the teachings of Tewari with the teachings of Funkhouser in light of such explicit disclosure. Such teachings and suggestion would lead one of ordinary skill in the art to seek out another reference that is not like Funkhouser but more like Tewari, which would still teach away from Applicants' claims 1, 10 and 19 and not satisfy the requirements of obviousness under 35 U.S.C. §103.

With respect to Whitney, one of ordinary skill in the art would not in turn seek out the Whitney reference as the examiner now alternatively relies upon to frame the present rejection. Applicants draw the examiner's attention to the text preceding the examiner's cited text. At col. 2, lines 28-35, Whitney teaches the following:

"Plasma welding results in much greater heating and consequent melting of the substrate, with the feed material fed into the weld pool rather than being melted and then deposited

upon an unmelted surface. In contrast, in laser plasma spraying the focal point of the laser and the central portion of the plasma are maintained at a sufficiently great distance from the surface of the substrate that the substrate is not melted.”

The examiner contends it would have been obvious to one of ordinary skill in the art at the time of the invention to the dimensions as taught by Whitney et al. in the Tewari et al. system because they are both directed towards the coating/deposition of material on a workpiece using a laser beam for melting the powder. Such an “obvious to try” argument clearly fails when considering the teachings of Whitney as a whole. One of ordinary skill in the art would not read the text at col. 2, lines 28-41 and find the requisite motivation to alter the combined teachings of Tewari and Gray and teach “positioning a laser apparatus over the article such that a focal point of said laser is about 0.10 inches to about 1 inch above the affected section and said laser forms a defocused hot zone at a distance above the affected section sufficient to prevent the article from melting” of Applicants’ claims 1, 10 and 19, especially when Whitney teaches specifically to maintain the focal point of the laser and the central portion of the plasma at a sufficiently great distance from the surface of the substrate so that the substrate does not melt. Whitney would never consider placing the focal point of the laser at a distance of less than 1 inch from the surface of a substrate when considering the teachings as a whole. Moreover, Whitney clearly failed to appreciate the ability to position the focal point of a laser at a distance of less than 1 inch from the surface of a substrate. Hence, Applicants’ claimed range of about 0.10 inches to about 1 inch still arguably falls outside Whitney’s teachings given the fact Whitney would never consider maintaining the focal point of the laser at a distance of 1 inch or less. Applicants contend Whitney cannot be relied upon to effectively teach, suggest or provide the requisite motivation to alter the combined teachings of Tewari in view of Gray and teach all of the elements recited in Applicants’ independent claims 1, 10 and 19.

In light of the foregoing, Applicants contend independent claims 1, 10 and 19 are patentable over the combined teachings of either Tewari in view of Gray and further in view of Funkhouser or Tewari in view of Gray and further in view of Whitney.

For at least these reasons, Applicants respectfully request the Examiner withdraw the rejection under 35 U.S.C. §103(a) and find that claims 1, 5-10, 13-20 and 23-24 are allowable.

The Examiner rejected claims 2, 11, and 21 under 35 U.S.C. §103(a) as being unpatentable over Tewari and Gray et al. in view of Funkhouser or Whitney, as stated above, and further in view of U.S.P.N. 6,173,491 to Goodwater et al. ("Goodwater").

Applicants' claims 2, 11 and 21 ultimately depend upon independent claims 1, 10 and 19.

As discussed above, the combination of Tewari in view of Gray does not teach, suggest or provide the requisite motivation to one of ordinary skill in the art to modify the combination of teachings in order to place a focal point of a laser about 0.10 inches to about 1 inch above the affected section as recited in Applicants' amended independent claims 1, 10 and 19. Furthermore, the teachings of both Funkhouser directly contravene the combined teachings of Tewari in view of Gray, and do not teach, suggest or provide the requisite motivation to alter their teachings and render obvious Applicants' claims 1, 10 and 19. Moreover, the teachings of Whitney cannot be relied upon as asserted by the examiner when combined with the teachings of Tewari in view of Gray, and do not teach, suggest or provide the requisite motivation to alter their teachings and render obvious Applicants' claims 1, 10 and 19. Lastly, Goodwater does not cure the deficiencies present in the combined teachings of these cited references.

Goodwater generally teaches a method for refurbishing turbine engine vanes (Abstract). However, the teachings of Goodwater when combined with Tewari and Gray also fail to teach or suggest the placement of a focal point of a laser at said distance.

In light of the foregoing, Applicants contend the subject matter of independent claims 1, 10 and 19 are patentable over the combination of Tewari in view of Gray, and further in view of either Funkhouser or Whitney, and further in view of Goodwater.

For at least these reasons, Applicants respectfully request the Examiner withdraw the rejection under 35 U.S.C. §103(a) and find that claims 2, 11 and 21 are allowable.

CONCLUSION

In light of the foregoing, it is submitted that all of the claims as pending patentably define over the art of record and an early indication of same is respectfully requested.

An earnest and thorough attempt has been made by the undersigned to resolve the outstanding issues in this case and place same in condition for allowance. If the Examiner has any questions or feels that a telephone or personal interview would be helpful in resolving any outstanding issues which remain in this application after consideration of this amendment, the Examiner is courteously invited to telephone the undersigned and the same would be gratefully appreciated.

It is submitted that the claims as amended herein patentably define over the art relied on by the Examiner and early allowance of same is courteously solicited.

If any fees are required in connection with this case, it is respectfully requested that they be charged to Deposit Account No. 21-0279.

Respectfully submitted,

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